2017

ELECTRONICS

(*Basic Circuit Theory and Network Analysis*)

[Honours]

(CBCS)

[First Semester]

PAPER — C1T

Full Marks : 40

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

*Illustrate the answers wherever necessary*

1. Answer any *five* questions from the following :

   2×5

   (*a*) A sinusoidal voltage is represented by $v = 141.4 \sin(314.18\, t - 90°)$. Find the r.m.s. value and frequency of the voltage.

(b) Find the thevenin's voltage and resistance of the following circuit as seen resistance of the following circuit as seen at $a - b$.
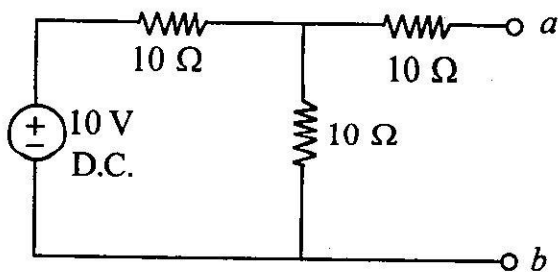

(c) There resistance $4\,\Omega$, $6\,\Omega$ and $8\,\Omega$ are connected in parallel. In which resistor power dissipation will be maximum and why?

(d) What do you mean by active and passive network elements? Give suitable exampls.

(e) If the impedance of an inductive coil is $Z = (5 + j\,10)$ ohm, find conductance of the coil.

(f) Explain how Q acts as an amplification factor in resonant circuit?

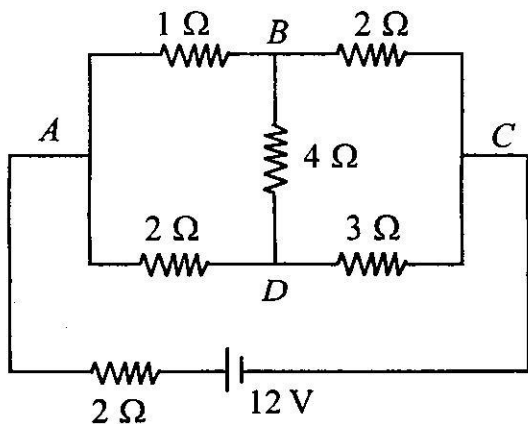(g) Find the equivalent resistance errors the terminal a & b.
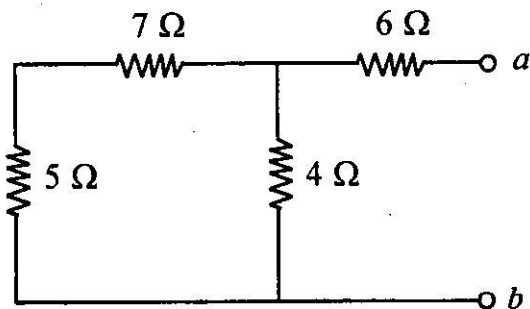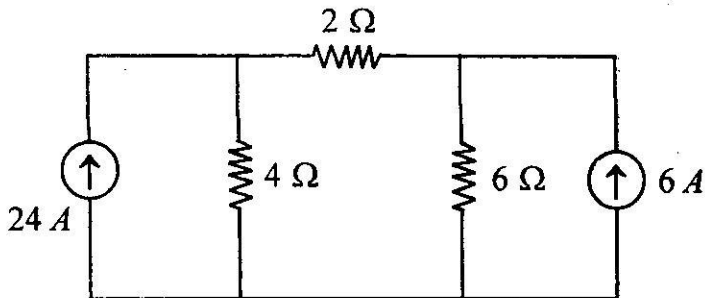

(h) Convert the following circuit to a T Network.
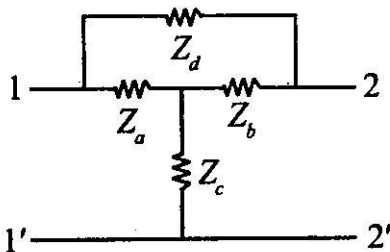
2. Answer any *four* questions from the following :

5 × 4

(a) Find the circuit in each branch of the network using Kirchhoff's laws.

(b) State and prove the maximum power transfer theorem

(c) Applying superposition theorem, compute the current through the 2 Ω resistor in the following circuit.

(*Continued*)

(*d*) Prove that the current in purely capacitive circuit leads the applied voltage by an angle 90° and draw their waveforms. Also calculate the average power of capacitive circuit.

(*e*) Find the Thevenin's equivalent circuit of the following figure between the terminals *x* − *y*.
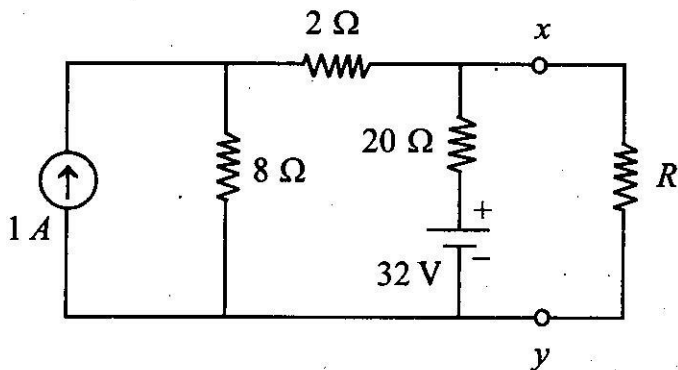
(*f*) For a two port reciprocal Network prove that
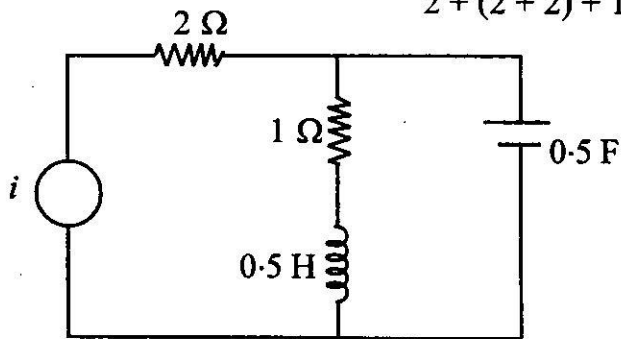$$AD - BC = 1$$

3. Answer any *one* question : 10 × 1

(*a*) Define Q and fine its expression for an inductor and a cap action. Explain how the Q of a coil various with frequency.

The following circuit is driver by a current source $i = 4\sqrt{2} \sin 2t \ A$ and is in the steady state. Find the impedence faced by the current source and the power dissipated.

$$2 + (2 + 2) + 1 + 3$$

(*b*) (*i*) Explain Delta Δ – star (Y) conversion and star (Y) – Delta (Δ) conversion, for a purely resistive circuit. $2\frac{1}{2} + 2\frac{1}{2}$

(*ii*) Reduce the network given in the next

page of obtain the equivalent reistance
as seen between nodes *cd*. 5